Experimental and Theoretical Comparison Between the Ball and Pinned Bearing Working as Backup Bearing for Magnetically Levitated Rotors

The papers focuses on the modelling and experimental validation the vibro-impact dynamic behaviour of rotors interacting with two types of backup bearings, i.e. one pinned backup bearing with polymeric pins (original contribution to the problem) and another common ball bearing (conventional). The impact forces are modelled using Hunt and Crossley approach. The parameters of the constitutive equation responsible for describing the contact forces are a priori identified in auxiliary tests. The vibro-impact model is built by coupling the nonlinear contact forces with the rotor-bearing system dynamics and the theoretical results are obtained by integrating the coupled equations in time. A fully-instrumented test bench is designed, built and used to validate the experimental results. The effectiveness of the pinned bearing is evaluated in terms of orbits and maximum vibration.

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